A deep-diving seal expands whiskers for active prey-sensing in the dark ocean

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Visual sense in diving predators is often of limited use underwater, especially in the deep marine environment. Therefore, pinnipeds, which do not echolocate as odontocete cetaceans do, are expected to rely largely on vibrissal system to locate prey by following hydrodynamic trails. However, it remains unclear whether pinnipeds use vibrissal system in nature. Here, we monitored whisker movements of a deep-diving pinniped, a northern elephant seal, by deploying a video camera (with red-light flash) on the cheek of the seal. The movie lasted for 93 min, covering four complete dives (up to 473 m) at nighttime during oceanic migration. Seals mostly kept whiskers closed at shallow depths (for 93.7% of time at < 350 m) where no sign of prey appeared in the movie. Seals often expanded whiskers at deep depths (for 46.4% of time at > 350 m), suggesting that they started to use vibrissal system for active prey-sensing once reaching a certain depth. In fact, this depth matches where prey footage appeared (e.g. escaping fish with bioluminescence) although only 0.6% of movie frames included the prey footage. Our results demonstrate that seals rely on the active prey-sensing using vibrissal system, possibly in addition to visual sense in the occasional existence of bioluminescence, giving an important implication for the sensory modality of pinnipeds that exploit deep dark ocean.